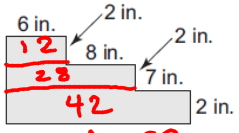
# Other Quadrilaterals:

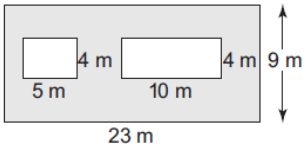
# Trapezoids and Kites

**5.**



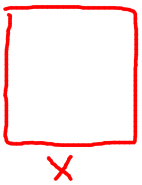

12
28
42
A = 82

**6.**




207
− 60
147

**8.** A rectangle is 6 meters longer than it is wide. The area of the rectangle is 315 square meters. Find the length.




$(x)(x+6) = 315$

$x^2 + 6x = 315$

$x^2 + 6x - 315 = 0$

$x = \frac{-6 \pm \sqrt{6^2 - 4(1)(-315)}}{2(1)}$

$= \frac{-6 \pm \sqrt{36 + 1260}}{2}$

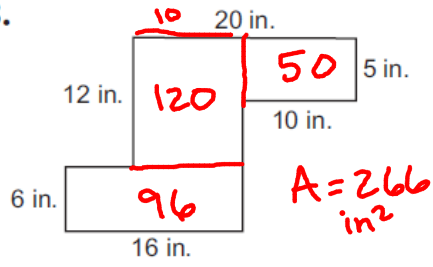
$= \frac{-6 \pm \sqrt{1296}}{2}$

$= \frac{-6 \pm 36}{2}$

$\frac{30}{2} = 15$

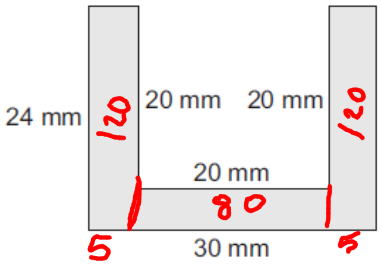
$\frac{-42}{2} = -21$

**3.**



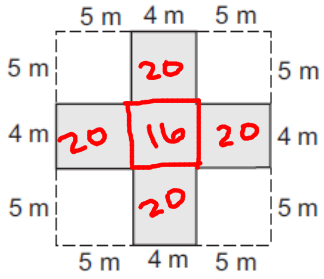

$A = 266\ in^2$

**5.**



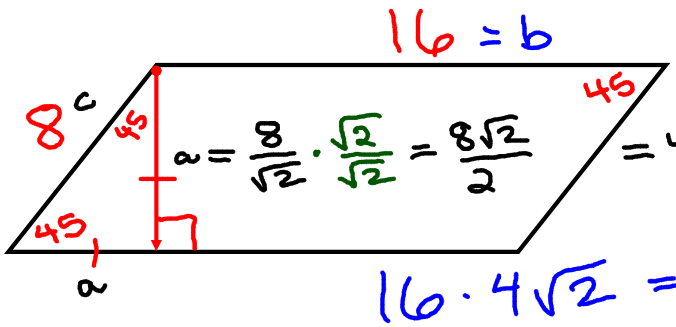

$A = 320\ mm^2$

**6.**




$96\ m^2$

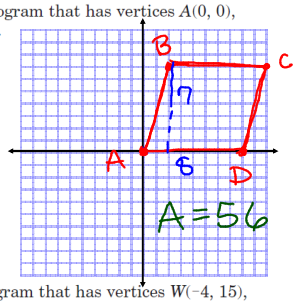
**7.** The sides of a parallelogram have lengths 8 inches and 16 inches and one of the angles of the parallelogram has a measure of 45°. Find the area of the parallelogram.



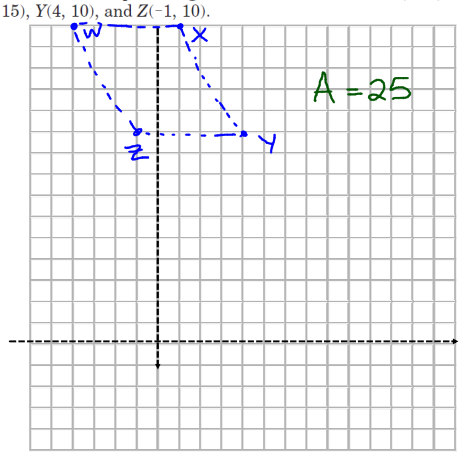

$a = \frac{8}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{8\sqrt{2}}{2} = 4\sqrt{2} = h$

$16 \cdot 4\sqrt{2} = 64\sqrt{2}$

**8.** Find the area of the parallelogram that has vertices $A(0, 0)$, $B(2, 7)$, $C(10, 7)$, and $D(8, 0)$.

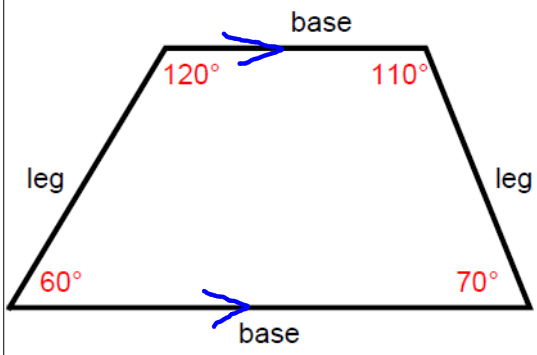


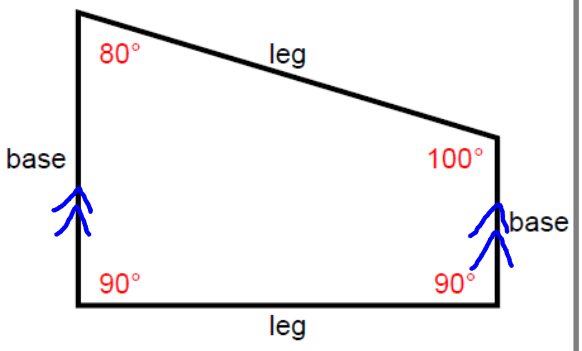

**9.** Find the area of the parallelogram that has vertices $W(-4, 15)$, $X(1, 15)$, $Y(4, 10)$, and $Z(-1, 10)$.



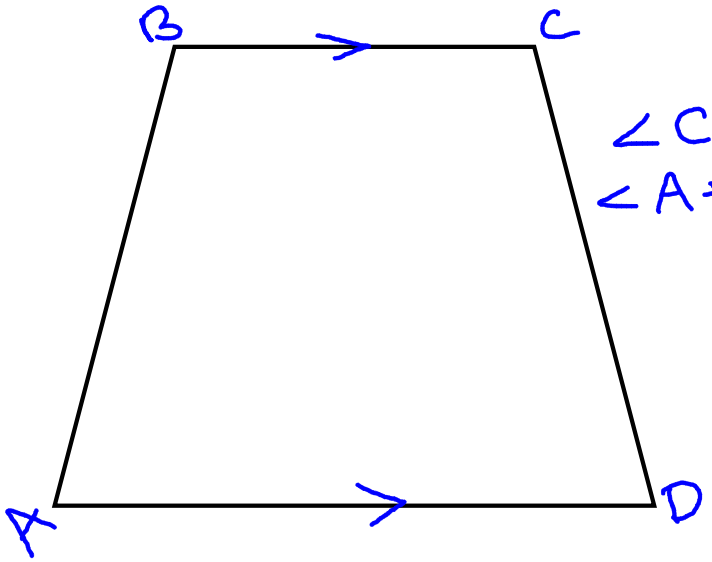

## What is a trapezoid?

It is a quadrilateral with exactly one pair of parallel sides. The parallel sides are called the **bases** and the other sides are called the **legs**.



## What you know about a trapezoid....



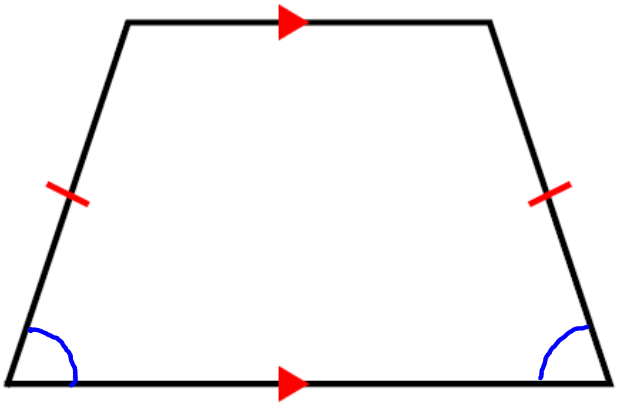

$\overline{AD} \parallel \overline{BC}$

$\angle C + \angle D = 180$

$\angle A + \angle B = 180$

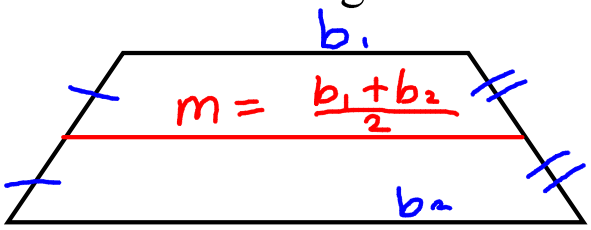
A trapezoid with congruent legs is called an **isosceles trapezoid.**

If you cut out an isosceles trapezoid from a piece of paper and fold it over so that the legs coincide, you will find the both pair of **base angles** are congruent.

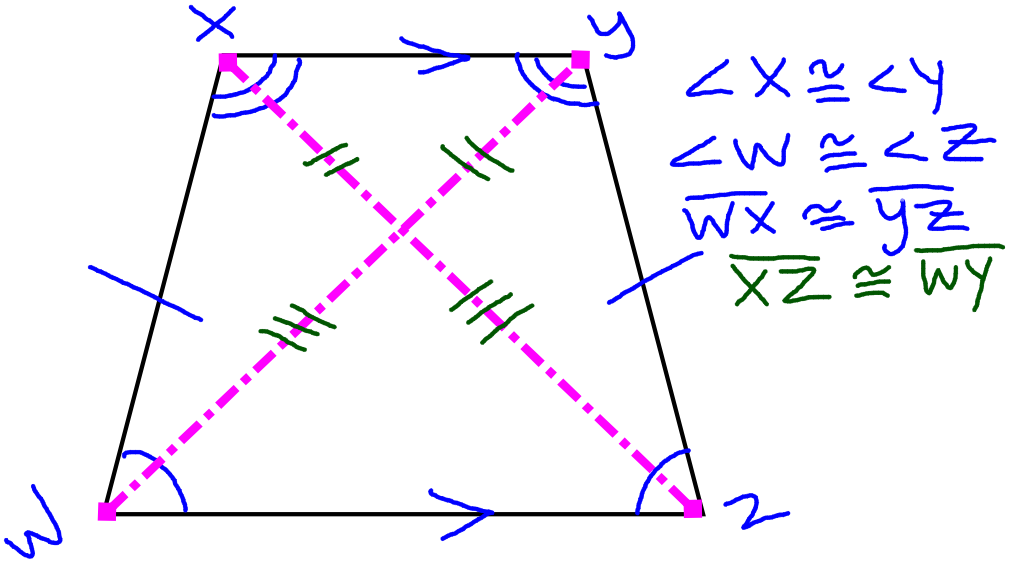


The **median** of a trapezoid is the segment that joins the midpoints of the legs. This is not the same usage as when we say the median of a triangle.

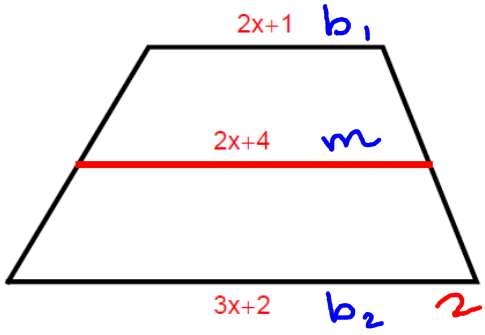
**The median of a trapezoid**
(1) is parallel to the bases;
(2) has a length equal to the average of the base lengths (i.e. 1/2 the sum of the lengths of the bases)




What you know about an isosceles trapezoid....



**Example 1:** The diagram below shows a trapezoid and its median. Find the value of x.




$$m = \frac{b_1 + b_2}{2}$$

$$2x+4 = \frac{(2x+1)+(3x+2)}{2}$$

$$(2x+4) = \frac{5x+3}{2} \cdot 2$$

$$4x + 8 = 5x + 3$$

$$-3 \qquad -3$$

$$4x + 5 = 5x$$

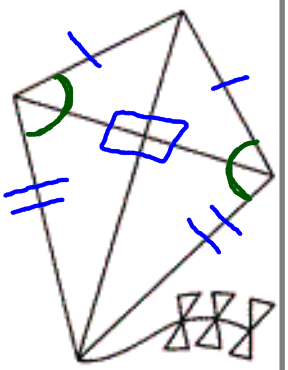
$$-4x \qquad -4x$$

$$5 = x$$

What is a kite?
It has two pairs of equal sides. Each pair must be adjacent sides (sharing a common vertex).

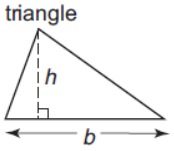
Diagonals intersect at right angles.

Angles between unequal sides are equal.



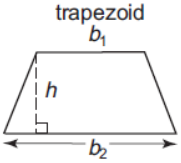
Formulas for the areas of triangles, trapezoids, and rhombi can be obtained from the formula for the area of a parallelogram.

triangle




$A = \frac{1}{2}bh$

trapezoid

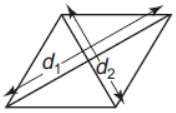



$A = \frac{1}{2}h(b_1 + b_2)$

A=hm

Kite

rhombus




$A = \frac{1}{2}d_1d_2$